

## Russian BT Series

by John F. Milsom



# AFV/Weapons Profiles

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*BT-7-2s under the gaze of Lenin's statue in Minsk before the Great Patriotic War which began in June 1941.*

# Russian BT Series

by John F. Milsom

"... MOSCOW, the Morning of October 7th, 1931. Thousands of spectators, assembled in the Red Square, viewed the impressive military march-past in commemoration of the October Revolution. Firstly passed the infantry detachments, then artillery of assorted calibres, and finally the armoured troops. In the distance could be heard the murmur of many engines and then, suddenly, there appeared in the Square two entirely new tanks. They moved along as fast as any car. One of these moved on its tracks, the other, however, on its wheels..."

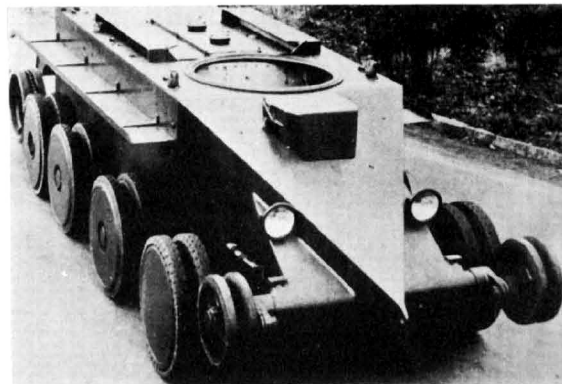
This eye-witness account by a military historian described the debut of a new era in Soviet tank development, the public display of the first two BT tanks.

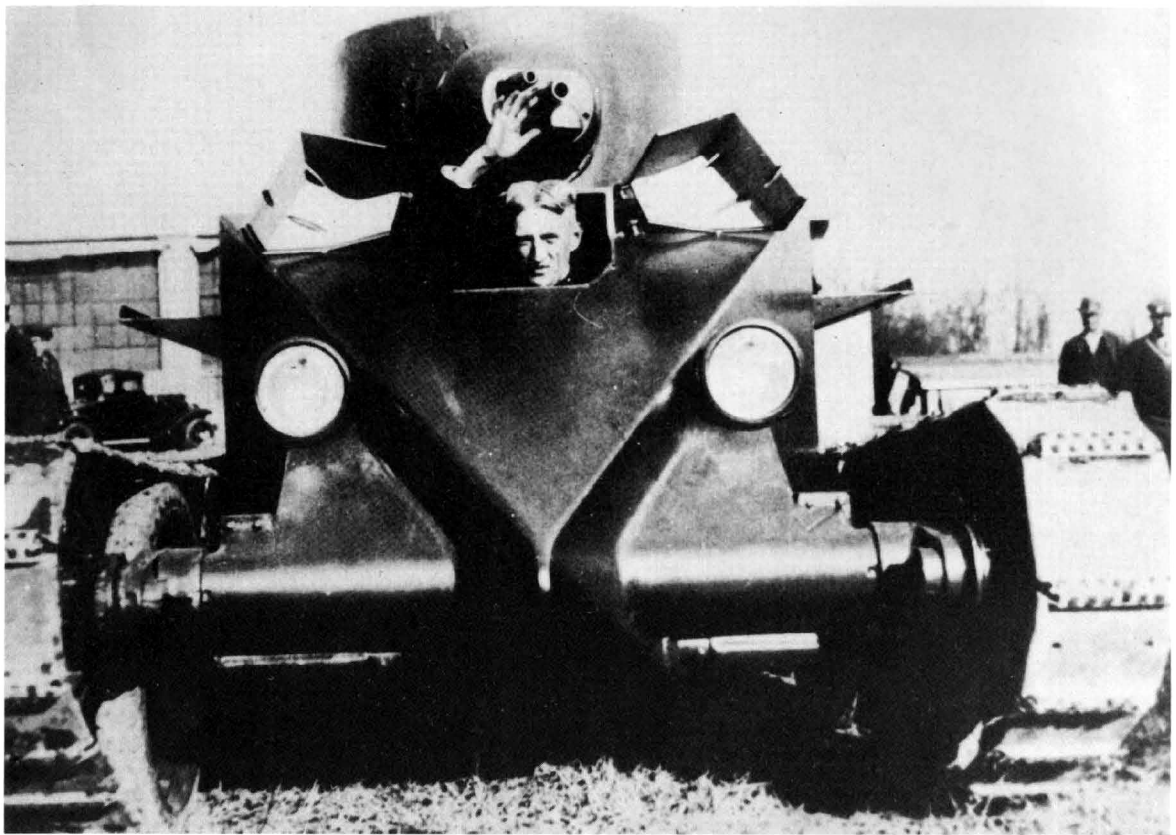
The Russian BT tank was the unique application of an outstanding technological development to an equally outstanding tactical doctrine. During the early 1930s the Soviets adopted the mobile war philosophies of Fuller and Liddell Hart and were able to translate these into real possibilities through the efforts of the American engineer J. W. Christie.

On December 30, 1929 a special commission, headed by the Director of Mechanisation and Motorisation of the Red Army, I. A. Khalepski, and Defence Industrial Representative, D. F. Budniak, set out on a tour of Europe and the U.S.A. They inspected available armoured vehicles under development or in the process of testing, which might be considered adequate for the new tactical roles envisaged by the Red Army. In the U.S.A. they were greatly impressed by the new wheel/

track design built by J. W. Christie. The Russians displayed great admiration for Christie—with the political comment "that it is unfortunate that he was born in the imperialist camp and hence not given the chance to exploit his ideas to the full." Tukhachevsky had approached Stalin on at least one occasion with a proposal for contacting Christie and offering him a substantial sum of money to aid the development of tanks in the USSR, but was criticised "for succumbing to western bourgeois teachings and ideas." Needless to say nothing came of the proposal.

*The first production Christie M1931, designated Medium Tank T-3 by the United States Army. Nine were built of which two were bought by the Russians. This picture shows the tank without its turret and with the driver's butterfly hatch closed.*





*J. Walter Christie, tank genius, in his M1931 (T-3) medium tank which became the BT-1 and, through the development of the BT series, evolved into the T-34. Christie's similar M1932 design was sold to Britain and became the A13 cruiser prototype.*

## TACTICAL REQUIREMENTS

During the formulation of the Field Service Regulations a requirement was laid down for a fast tank suitable for "long-range" operations, whereby:

"The role of long-range tanks is to penetrate to the furthest limits of the whole defensive system, destroy the enemy reserves and HQs and cut off the enemy's retreat. Their actions should be planned so that the infantry and their supporting tanks, taking advantage of the disorganisation effected by the long-range tanks, may move forward and prevent any reorganisation of the defence."

These long-range tanks were considered essential for the annihilation of enemy reserves, staff and artillery. The Russians considered high speed to be an essential

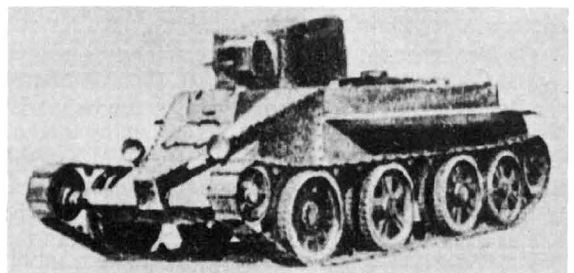
requirement for enveloping operations. The tanks were incorporated in DD groups (Dalynevo Deistviya = Long-Range) in not less than battalion strength. In a mobile war these DD groups were to be employed also as breakthrough tanks against fortified zones in support of infantry attacks.

In order to increase the shock power of these groups so that they might take on the artillery during the breakthrough of a fortified zone, a requirement was laid down for a tank-accompanying gun AST (Artilleriya Soprovoshenniya Tankov). These 76.2mm mountings (later referred to as artillery tanks) had 360 degrees traverse and were based on the BT tank chassis. The tactical doctrine applied maintained that each such gun should operate side by side with a platoon of tanks from the DD groups, covering them when they moved into

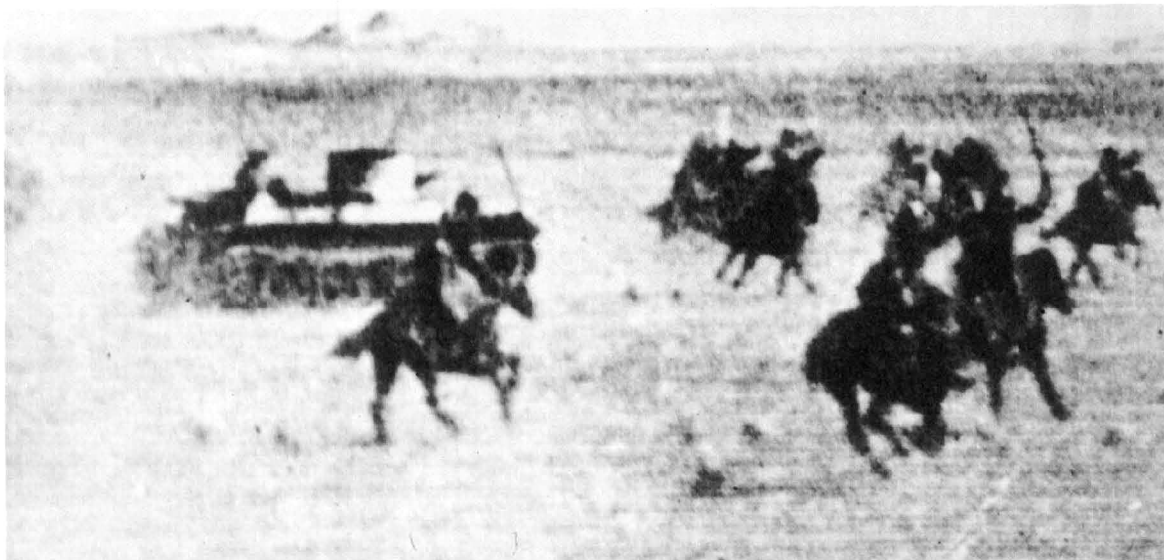
*BT-7A (artillery tank) supporting a cavalry operation. The BT-7A carried a 76.2mm gun.*



*Three-quarter front view of the BT-1. The BT was neither a medium nor a light tank. It had its own classification as a fast tank.*







*BT-1 in operation with Soviet cavalry.*

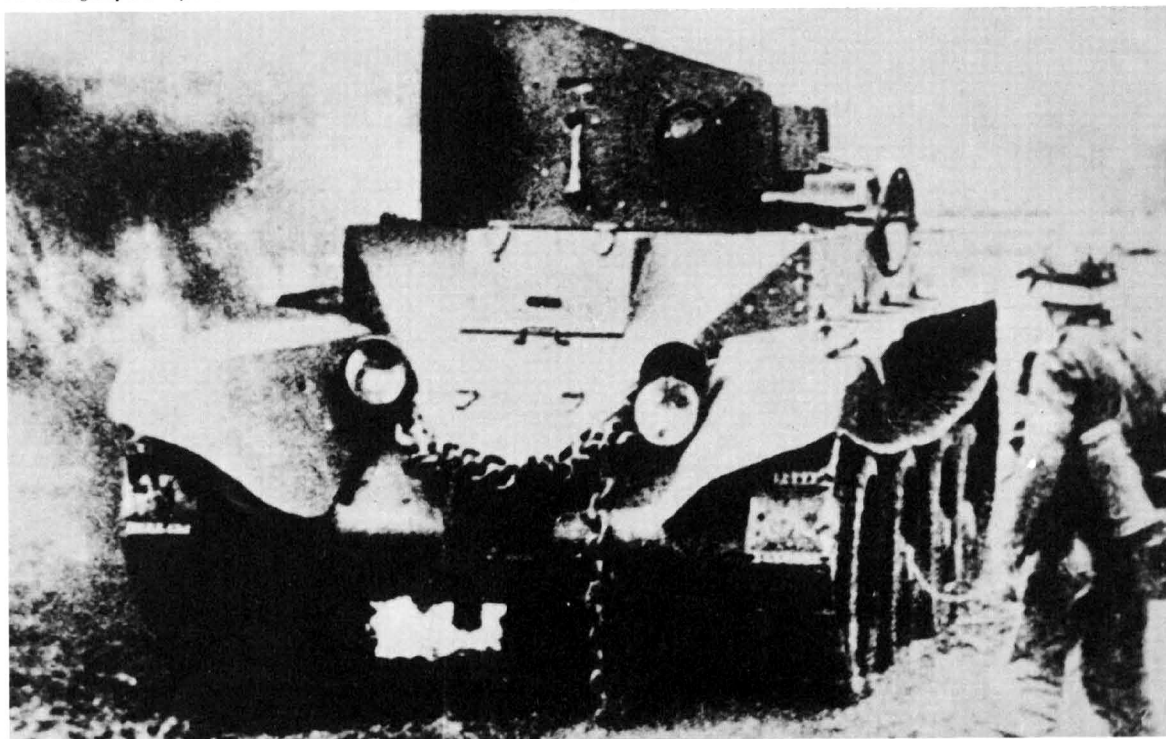
position. As soon as the normal gun tanks had reached a suitable point, the gun would then move on ahead to take up a new fire position in a leap-frog manner. It was vital then for all these vehicles to have sufficient speed so as to enable them to overtake each other quickly and take up new fire positions rapidly. The vehicle designed by Christie seemed to fill the bill admirably.

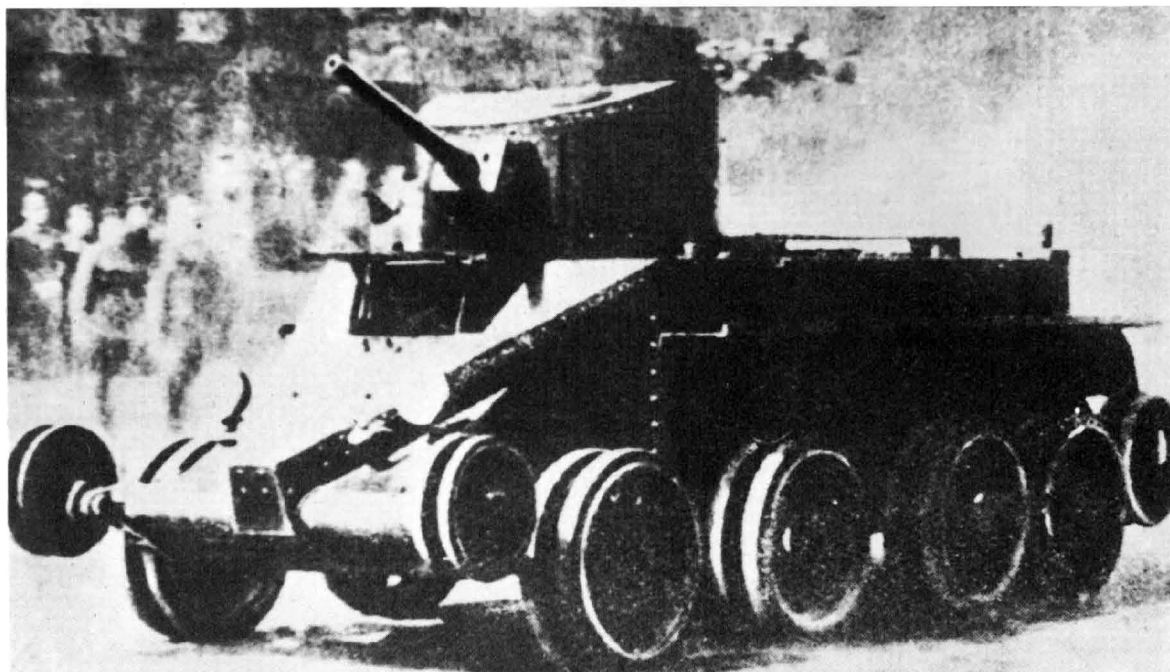
Apart from their unique role as "fast tanks" (Bystrochodniya Tankov) BTs were also employed by large independent and mechanised brigades at the disposal of the TRGK (High Command Reserve).

### EARLY DEVELOPMENT

During 1931 two Christie M-1931 (T-3) tanks were purchased from the USA and tested extensively by the Russians at one of their tank centres (Voronezh) to determine their suitability for use by the Soviet Army. The results of these tests were favourable, and during the same year, on February 13, the Revolutionary War Council of the USSR ordered design work to be initiated on a feasible variant of the Christie model conforming to the new tactical requirements. Manufacture of this first model (BT-1) commenced on May 23, 1931, at the

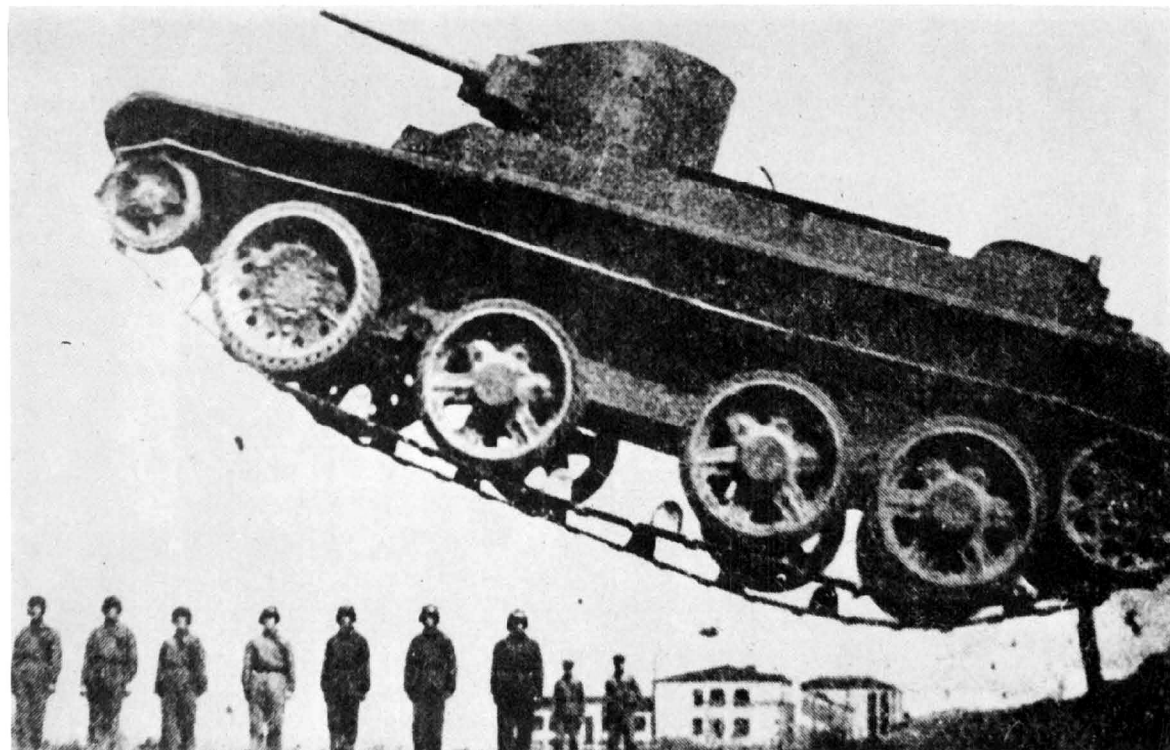
*BT-1 being inspected by a German soldier. This model had twin machine-guns in the turret.*





*Early production model of the BT-2 running on wheels. Compare the mantlet with that of the later production model.*

*BT-2 later production model: this had a 37mm gun and a separately ball-mounted 7.62mm DT machine-gun.*

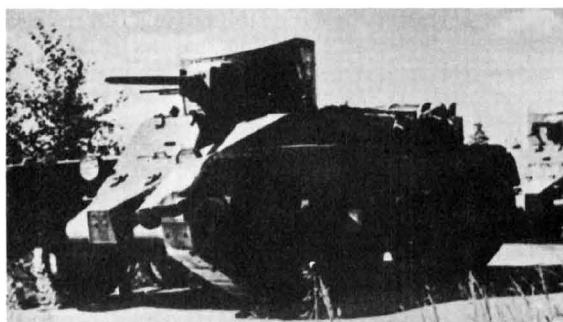






*BT-3: this model had a 45mm gun and a separately ball-mounted DT machine-gun.*

*BT-3s moving along a road. Wheels of the BT-3 were solid as opposed to spoked on BT-2.*



*BT-3s followed by T-26 A Light Tanks moving forward in close formation.*



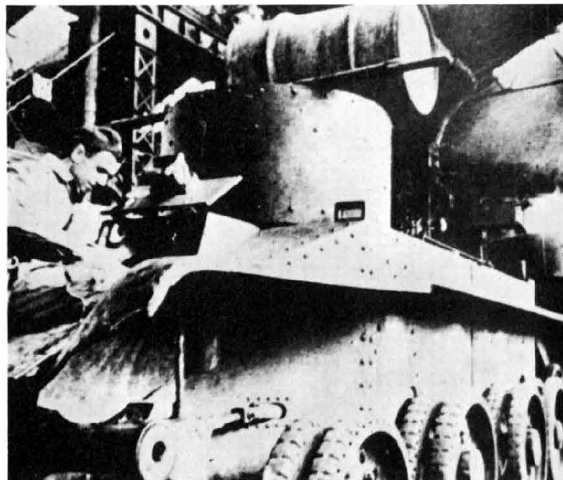
Komintern factory in Kharkov and it was completed by June. A simplified version of the tank was designed and the drawings dispatched to the factory during August. Two further prototypes were therefore built which became known as the BT-2. These were completed by September 3. Controlling the production of these vehicles was People's Commissar for Heavy Industry, G. K. Ordzhonikidze. Directly assisting design and production were S. M. Kirov, S. V. Kosior and A. A. Zdanov. The actual design team comprised members of the GUPV (Glavno Upravleniy Voennoy Promishlennosti—the Main Department of War Industry). Following completion the two tanks were subjected to rigorous trials and later, on October 7, they participated in the parade in the Red Square.

It was about this time that the Soviet High Command requested the installation of manufacturing facilities

for the mass production of these first BT tanks. This became an essential part of the Second Five Year Plan. Production was initially concentrated at the Komintern Factory, although eventually BTs were in production at 32 major tank plants. The Commission under Khalepski and Budniak (which had travelled abroad) had also visited Germany where they purchased the licence from BMW to produce the M-17 engine. This engine was adopted later to power BT and T-28 tanks.

### TECHNICAL DESCRIPTION

The general construction of the BT tank was fairly conventional for that time, apart from the unique Christie suspension utilising large diameter road-wheels. It closely resembled that of the original Christie vehicle in having the engine and transmission in the rear half,



*BT-3 tank undergoing repairs in a factory.*

*BT-3s of a DD (Dalynevo Deistviya = long-range) Group in a tank park.*

the turret—which was identical to that used on the original Christie tank—mounted centrally on the forward part; and the driver seated centrally at the extreme front. As with the original Christie tank, the BT could run on either wheels or tracks, a change from one state to the other taking about thirty minutes.

When running on tracks, the chain sprocket on each side of the driving wheel was replaced by four rollers which drove the tracks via the driving lugs carried on alternate track plates. When running on wheels, the power was transmitted from the main driving wheels to the solid steering bogie wheels (in contrast to the original Christie vehicles which had the rear pair of bogie wheels driven) through a chain drive (the hollow, forged-steel track plates being carried on shelves running along the sides of the hull). It became necessary to block up the front pair of road wheels which were fastened on lorry-type couplings, and able to be turned to the sides, enabling the tank to be steered.

In the tracked mode the vehicle was steered by the conventional clutch and brake method. The rear pair of bogie wheels carried about one-third of the tank weight; thus the tractive effort of the tank when moving on wheels was considerably less than when running on tracks. Wheeled motion was only advantageous on hard-surfaced roads, since on soft ground the driving wheels would dig into the soil and spin. As a result the opportunities for moving on wheels were greatly limited.

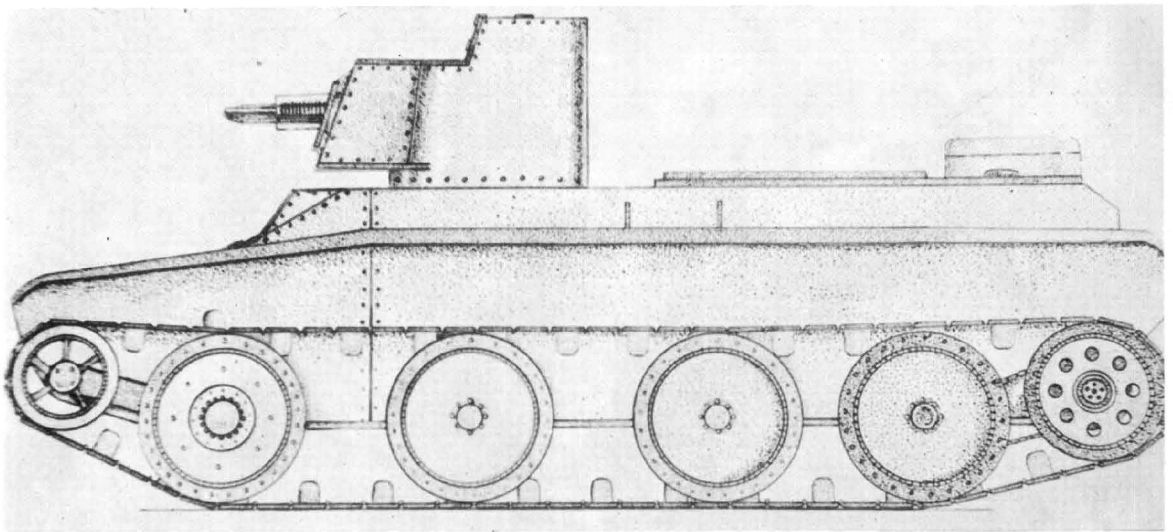
Although the BT incorporated this facility for running on either wheels or tracks throughout its period of use with the Soviet Army, the Russians rarely utilised the tank in the wheeled mode. This was probably due to the time required for the change-over operation, which meant that it had to be made outside the combat area.

The main advantage of the BT was not that it was a wheel/track vehicle, but that it could develop a high speed on tracks thus making it capable of carrying out long range operations and envelopments. High speed BT tanks demonstrated conclusively the feasibility of fast moving tank units during training and manoeuvres. There were, however, complaints that the tracks had a tendency to shed, especially if turns were at all abrupt and not handled smoothly. The BT tank employed a steering wheel as opposed to steering levers to cater for steering when on wheels.

In the manufacture of the original U.S. vehicle, extensive use had been made of electric-arc welding, but the early Soviet BT models were rivetted throughout. The performance of the tank was excellent, resulting from the high power-to-weight ratio and the unique Christie suspension. The Christie-type suspension used on this tank consisted of four large wheels per side, revolving on pivoted axle arms. Each wheel had dual rubber tyres, and each axle was controlled by a long adjustable coil spring housed vertically inside the hull side plates. The liberal compression amplitude gave each wheel an independent maximum vertical movement of about 14 inches. The Christie suspension provided a remarkably stable gun platform, but it necessitated a double-wall construction—there being an inner skin of 7.5mm—and therefore displaced a lot of room within the tank. This suspension was also vulnerable, intricate, and difficult to maintain in the field. The BT-1 was powered by a 400hp Russian version of the Liberty V type used in the original Christie tanks.

Unofficially the BT tank was called the "Betka" (Beetle) and, due to its three-man crew, also the "Tri Tankista" (Three Tanker). The basic models adopted for service were the BT-2, BT-5, BT-7 and BT-7M.





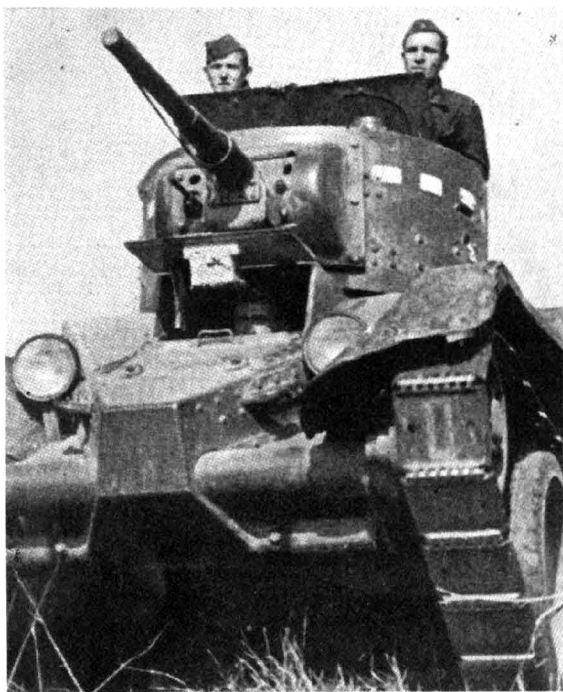
*BT-4 experimental infantry version of the BT tank which had twin turrets side by side like the T-26A Light Tank.*

*The basic BT-5 Fast Tank with the sharp semi-cylindrical mantlet of early production models.*



*Side view of BT-5 early production model. The BT-5 had a 45mm gun with coaxial machine-gun.*





*Later production BT-5 tank with new, rounded mantlet and twin turret hatches.*



*Close-up of BT-5(V) turret showing support for frame aerial and rounded mantlet. Machine-gun is not installed.*

## MODELS AND VARIANTS

The first model, the BT-1, was armed with two machine-guns in the turret. Trials with this tank proved the turret and armament installation to be below requirements, and production was halted after only one vehicle had been built. A second model, designated BT-2 (or Christie-Russkiy 1931) was constructed during late 1931. This model closely resembled the BT-1, but had a turret of a new design; the prototype, like the BT-1, was armed with two machine-guns, but production models mounted a 37mm M-1930 tank gun and one machine-gun.

The 37mm gun was aimed with the aid of a shoulder support, and the 7.62mm DT machine-gun was located separately—in a ball-mounting to the right of the gun.

The BT-2 was released for production in January 1932.

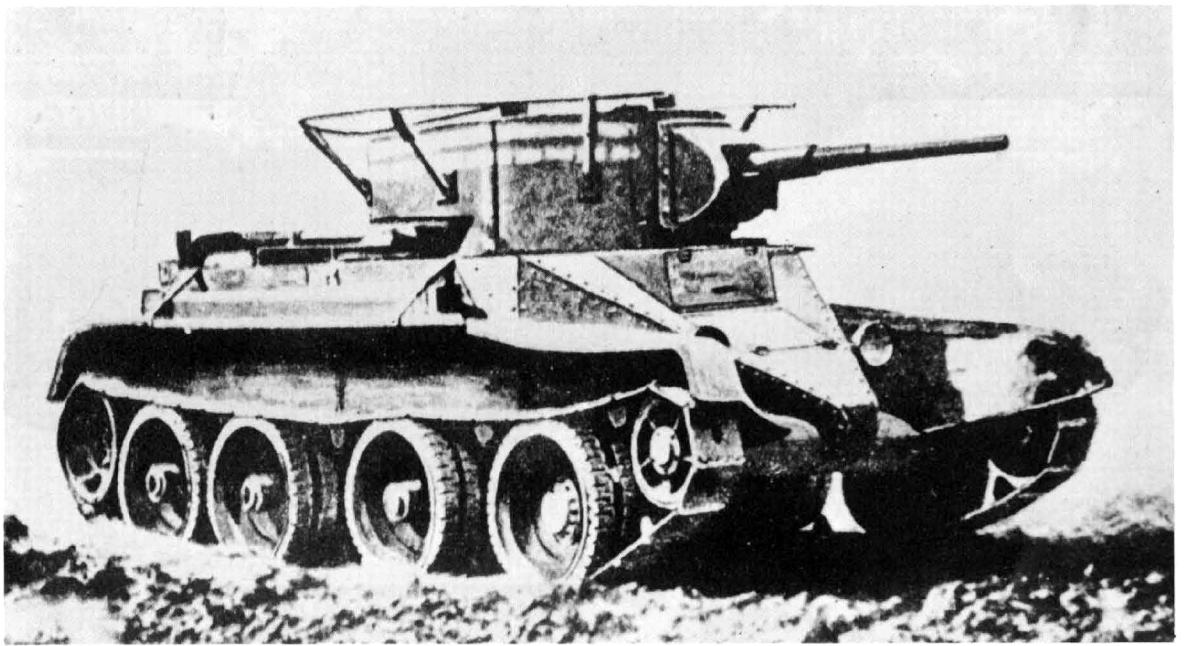
Even though the adoption of the BT-2 marked a significant advance in Soviet tank development, this model was still not found to be up to requirements. Two further models, BT-3 and BT-4, were developed to investigate various armament combinations. Whereas the BT-2 had mantlet guards and spoked wheels, the BT-3 had a slightly modified turret (with rear stowage box), no mantlet guards, and solid pressed-steel wheels. In place of the 37mm gun a 45mm anti-tank gun was mounted, but the separately ball-mounted DT machine-gun was retained. Only limited production of this third model was undertaken.

The BT-4 was an unsuccessful attempt to produce an

*Later model BT-5s on manoeuvres with the cavalry in evidence.*



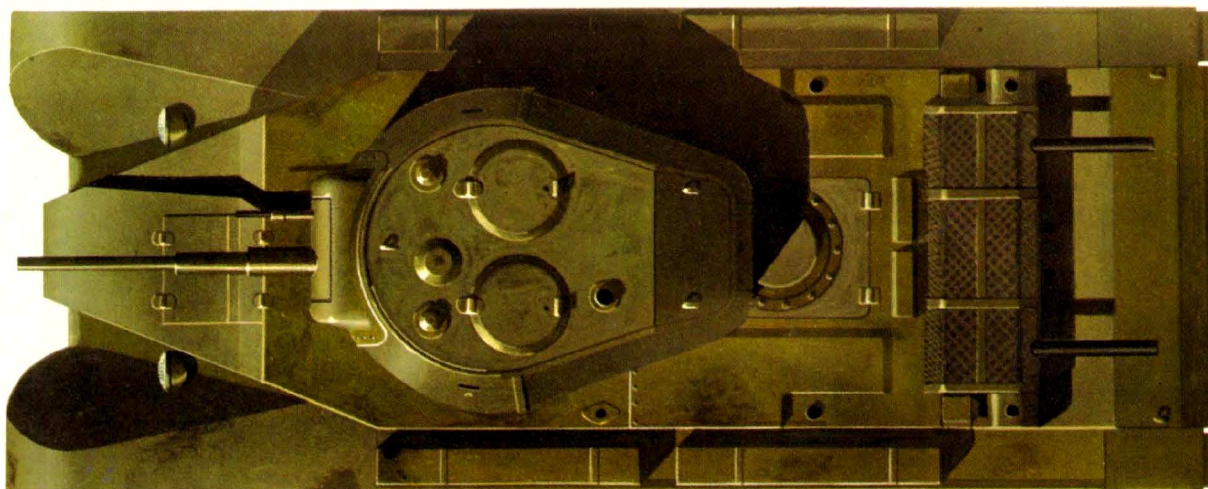
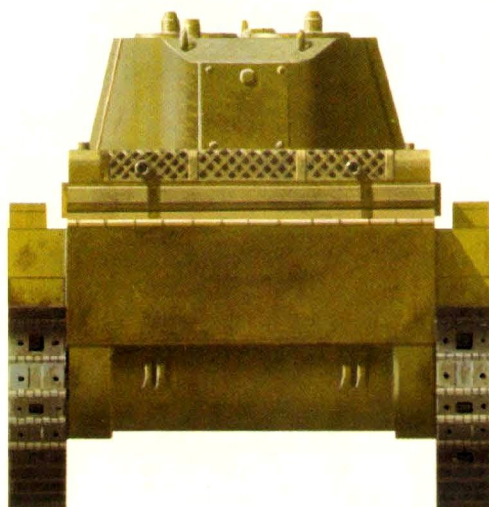
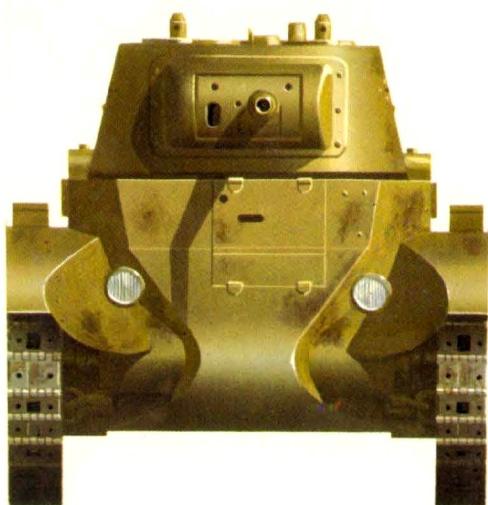
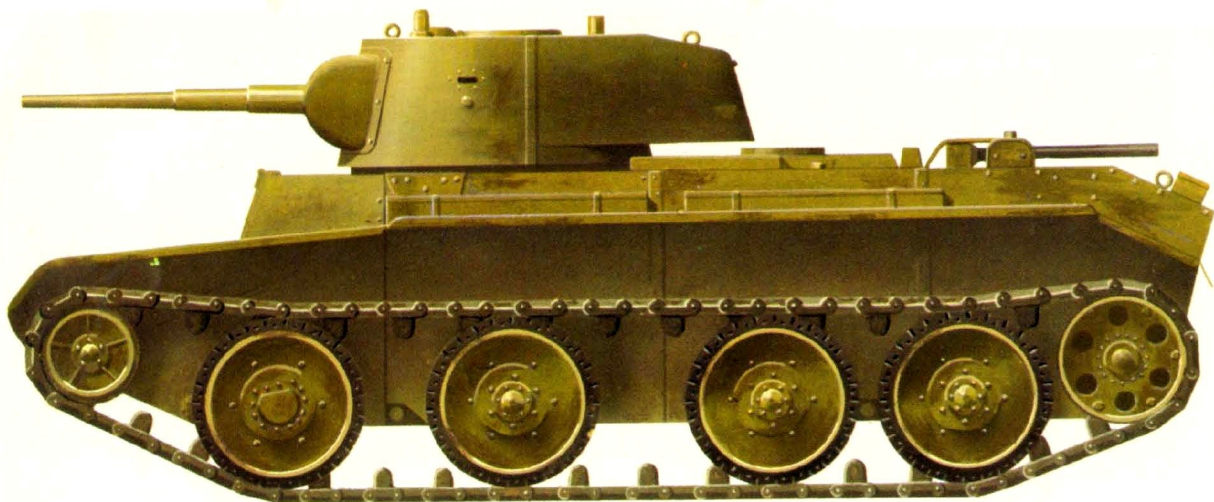




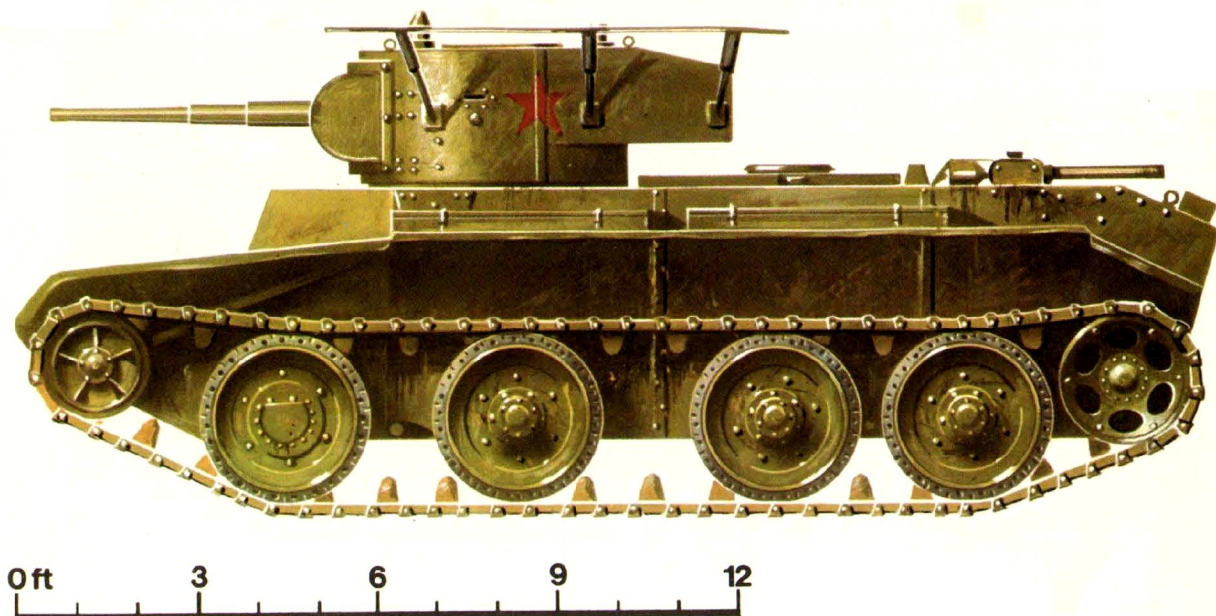
*BT-5(V): commander's model of the BT-5 tank with frame aerial round the turret roof.*

*BT-5A Artillery Tank with short 76.2mm gun.*







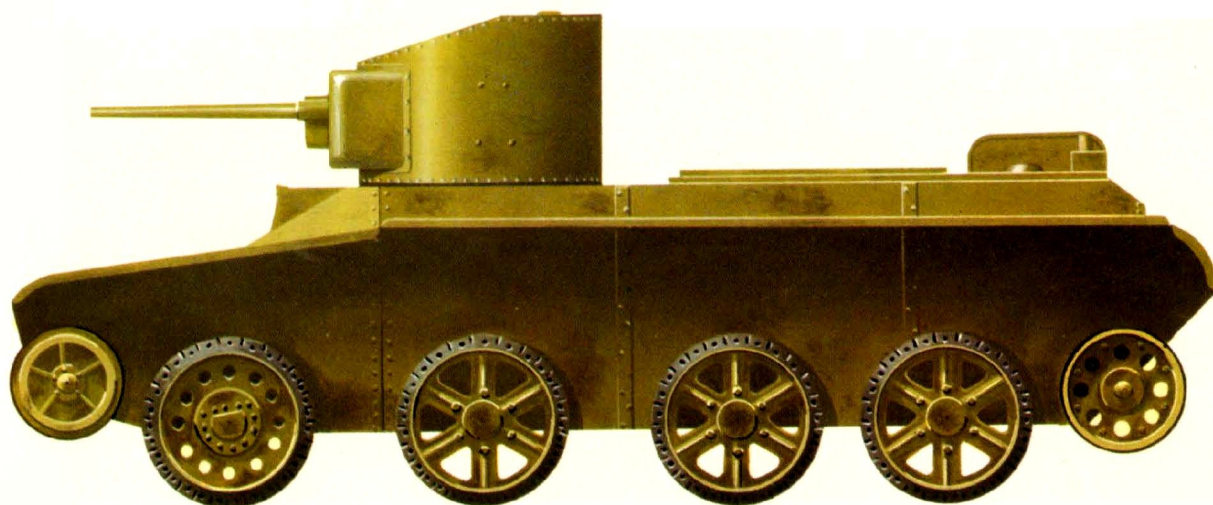


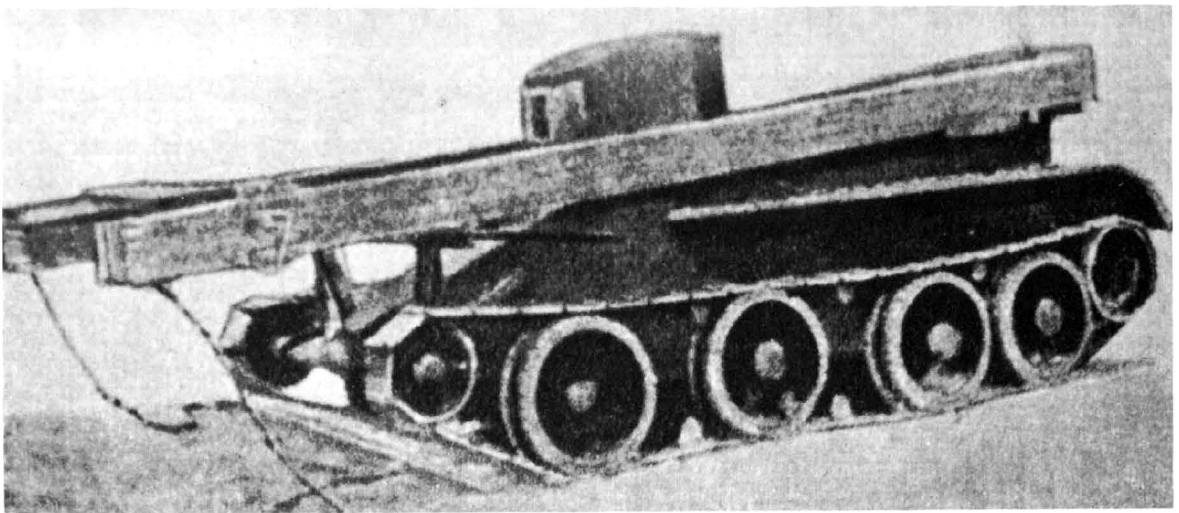
*Above:* BT-7-1(V), commander's tank, which had the cylindrical turret of the BT-5(V) with frame aerial and radio.

*Left:* Four views of the BT-7-2, the later production model of the BT-7 which had a conical turret and twin horn periscopes.

*Below:* BT-2 (later production model) in wheeled mode.

*Derek Johnson © Profile Publications Ltd.*





*The BT-3 bridge-laying tank.*



*BT-7-1: early production model of the BT-7 tank with new hull but retaining original cylindrical turret of the BT-5.*



*BT-DT (Dmovaya Tank) fitted with smoke emitters.*

infantry version of the BT equipped with the twin turret arrangement of the T-26A light tank series; only a few prototypes were made.

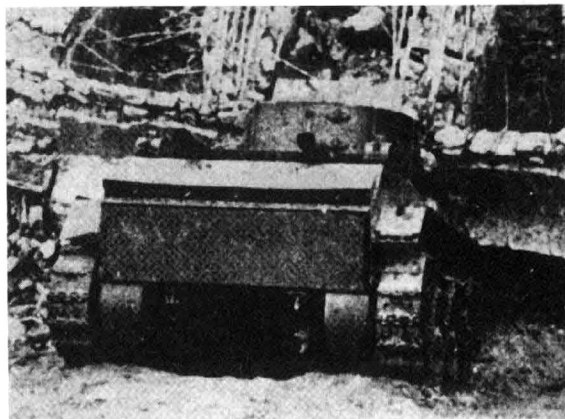
These first four BT models were powered by the Liberty 400 hp aircraft engine giving an approximate power-to-weight ratio of 35 hp/ton. This high power-to-weight ratio enabled the employment of a gearbox with four forward gears and one reverse.

Towards the end of 1932 a further BT model was specified with the following characteristics: the provision of more powerful armament, a coaxial mounting for the machine-gun, the provision of radio equipment, and more room in the turret and fighting compartment. Better mobility was to be achieved through the use of a newly-developed Soviet tank engine. Designated BT-5, this further model was therefore built mounting a 45mm M-1932 tank gun with coaxial machine-gun

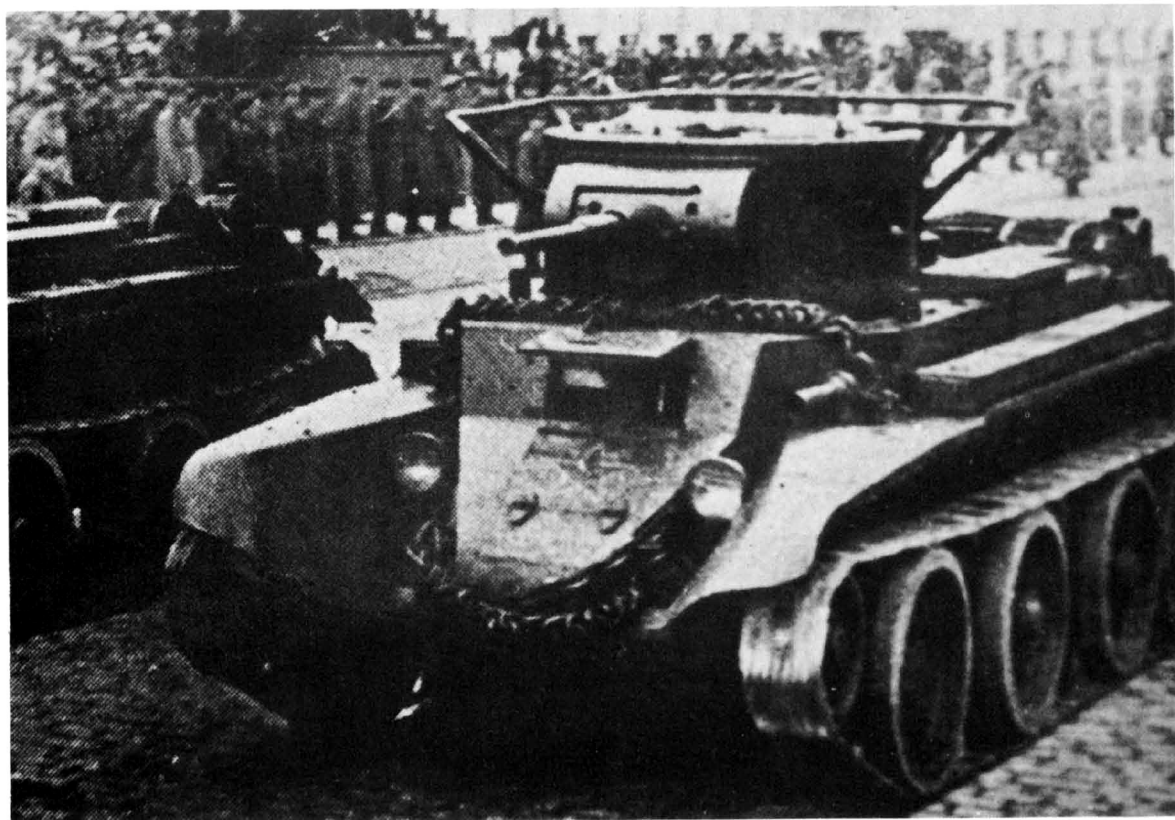
mounting in an improved turret with radio equipment. The 45mm armour-piercing shot of M-1932 gun had a muzzle velocity of 2350 fps—which provided a firepower greater than that of all foreign light tanks, and certain medium tanks, right up to the outbreak of World War II. The BT-5 also had a more powerful engine—the Soviet designed M-5 12-cylinder aircraft model, specially adapted for tank use.

The BT-5 turret was simultaneously adopted for the T-26B light tank. The original BT-5 turret was cylindrical, but later models had a faired-out overhang. Twin optical sights were provided (telescope and periscope). Another major improvement was the adoption of stronger suspension components. The armour remained unaltered. A commander's model, provided with radio and designated BT-5(V), was produced with a frame aerial around the turret roof.

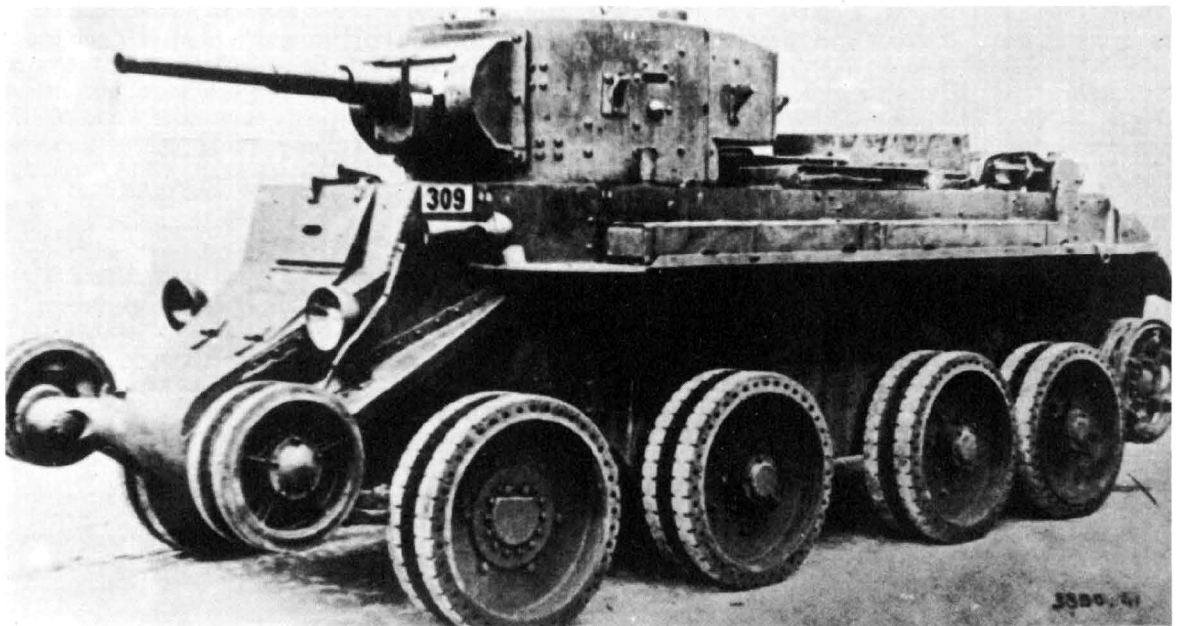
*Rear view of BT-7-1.*



*BT-7-1(V): commander's model of the BT-7-1 which had the turret of the BT-5(V) with frame aerial and radio.*

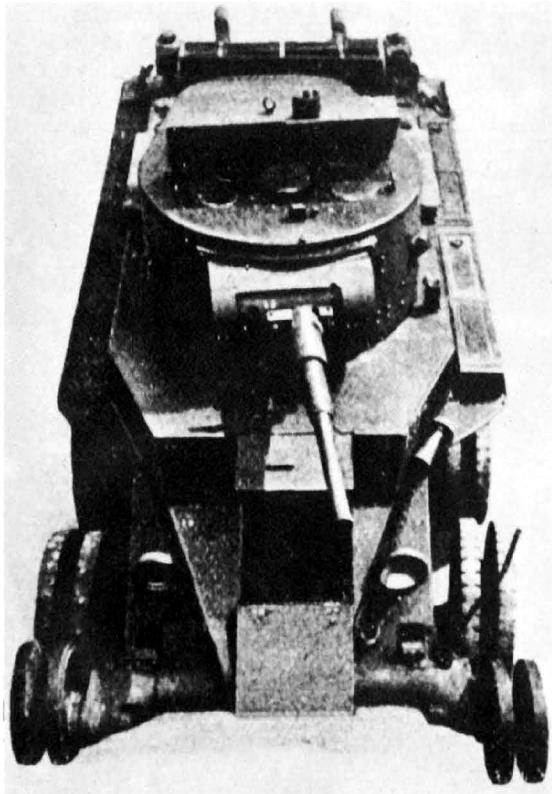






*BT-7-1(V) on wheels. Although the frame aerial has been removed the mountings for it on the turret are clearly visible.*

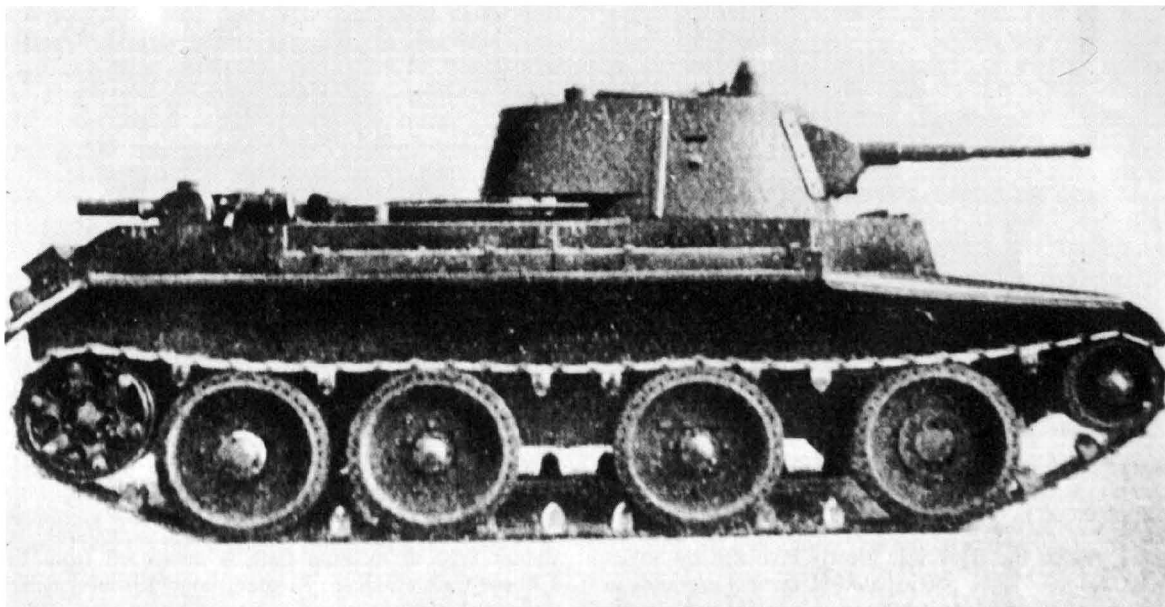
*Three-quarter plan view of BT-7-1(V) with frame aerial removed.*



The BT-5 went into production at the end of 1932; it was an extremely robust, successful application of the Christie chassis, and utilised the link-plate track later used for the original T-34 cruiser tank. The BT-5 became a standard model and remained in service until 1941. Apart from the turret, the general arrangement of this tank closely followed that of the BT-1; the turret and fighting compartment were similar to those used in the T-26B light tank. The BT-5 was demonstrated during the large-scale exercises in the Byelorussian Military District in 1935. A version of the BT-5 armed with a 76.2mm L/16.5 gun (and one or two machine-guns), designated BT-5A, was produced for use in second echelons as artillery fire support for assault tanks (Artilleriyskich Tank).

Engineers at the Kharkov plant designed a whole range of experimental BT variants for different roles. Two experimental special-purpose tanks were developed on the BT-3 design: in 1937 a BT-3 was converted to a bridge-layer with a crude wooden bridge that was folded over the turret and manually lifted forwards by the crew; and secondly, a flame-throwing version produced in 1937-40 had the turret and armament of the OT-133 (T-26C light flame-throwing tank). Bridging units in armoured formations received the BT-IT bridge-layer tank based on the BT-5, whilst older vehicles were reworked as crane-tanks (Podiemniya Tankov) for engineer units. Some BT tanks were fitted with smoke emitters (designated BT-DT), and others with emitters for poison gas which could lay a contaminated zone. During 1937 a certain number of BT-5 tanks were equipped with a special device enabling them to ford water obstacles by moving under water. Such vehicles were called BT-5PK. Some BTs were also provided with fascines.

Further development of the BT tank resulted from the production of a powerful modern engine with increased fuel capacity, and led to the construction in 1935 of the BT-7 (the BT-6 never passed the paper stage). Eventually becoming the most numerous Soviet

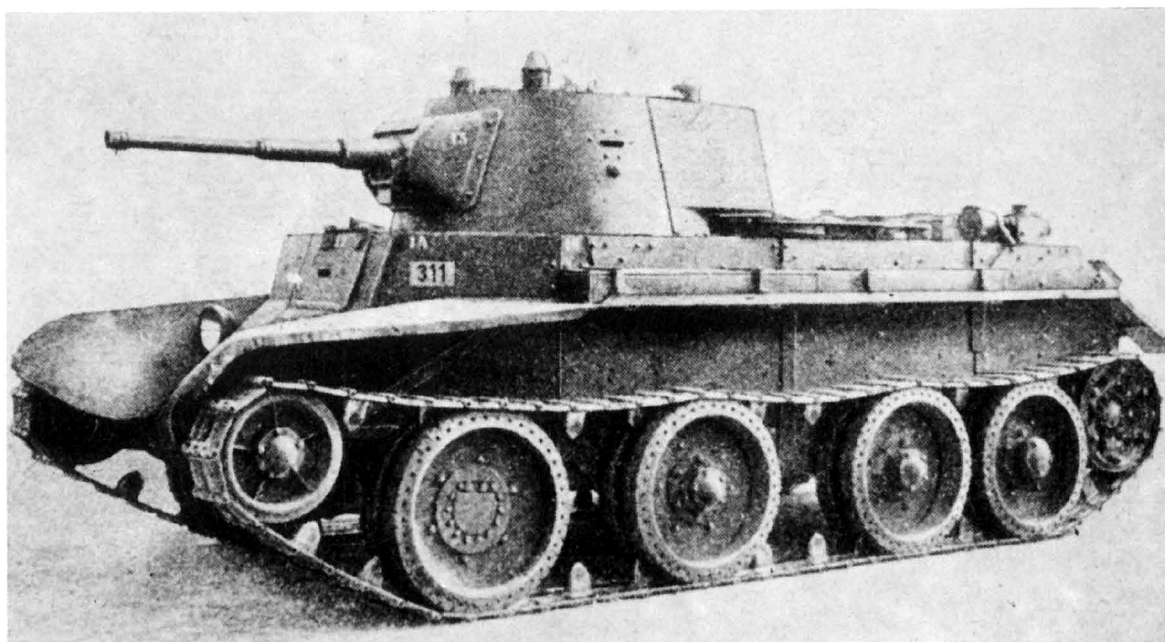


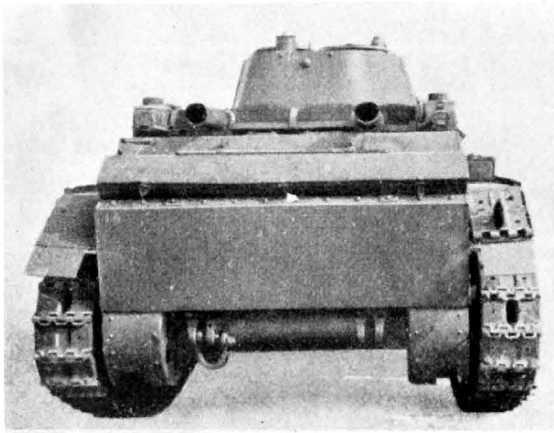
*Side view of BT-7-2.*

*A column of BT-7-2s. The BT-7-2 had a conical turret similar to that on the T-26S Light Tank.*

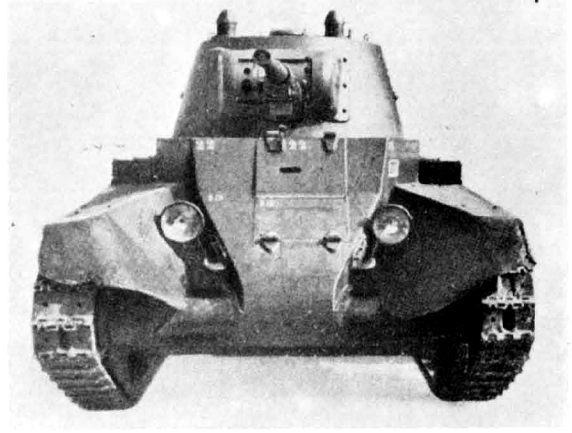


*The BT-7-2 was the first of the series to have the twin-horn periscopes as seen here on the top front of the turret.*





Rear view of BT-7-2.



Front view of BT-7-2. The family likeness to the Christie M1931 (T-3) is still strikingly apparent in this late model of the BT series.

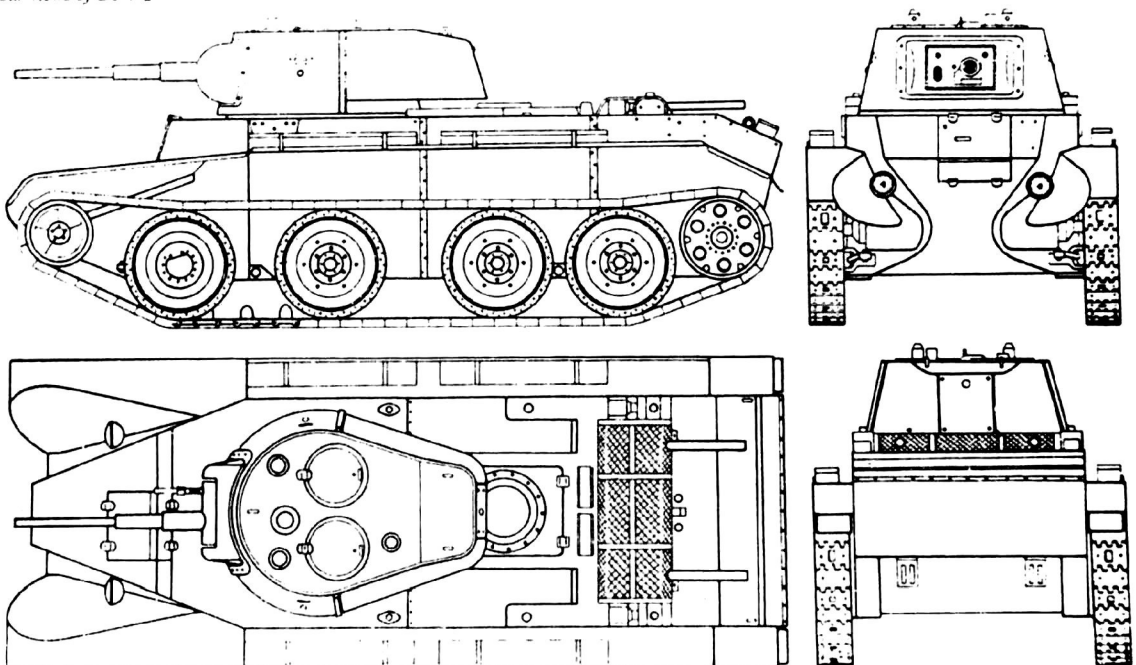
tank model, the BT-7 was greatly favoured by Soviet tank troops. BT-7s participated in tactical exercises in the Ukraine during 1935 and again in Byelorussia during autumn 1936. They aroused great admiration among foreign military observers. One of these, Colonel (later Lieut.-General Sir Giffard) Le. Q. Martel, wrote:

"The design of the fighting body is not very good but the performance of the machine is at least twice as good as the A9 [British Cruiser Mark I]. The suspension is excellent. The maximum speed is at least 30 mph, and it travels across average country at 20 mph easily. . . . We saw several machines pass at 30 mph over a prepared bank which had a vertical drop of 5 feet on the far side. The whole machine leapt through the air and cleared a 30 foot gap. There was no apparent damage to the suspension or the crew. The engine is an aircraft engine of some 300 hp output . . . . and the great advantage of using a really powerful engine is very apparent. This

lighter type of medium tank is developed from the Christie tank which the Russians bought from America and fitted with their own engine and armament. It has one 37mm gun and one machine-gun coaxial in the turret and I think 16mm armour basis. I think we should buy a Russian Christie at once to study the suspension."

The success of operations involving DD tank units equipped with BT-7s during the battles in the Khalkhin-Gol area of Manchuria in 1938, and of the march to western Byelorussia and the western Ukraine during the Soviet-German partition of Poland in September 1939, was made possible mainly by the high mobility and reliability of these tanks. The BT-7 was powered by the new M-17T engine (originally designed for aircraft use and also employed in the T-28), developing 450 hp at 1,750 rpm. It was also provided with a new steering system, transmission and suspension. A new clutch and considerably stronger gearbox was designed in which the

Four views of BT-7-2





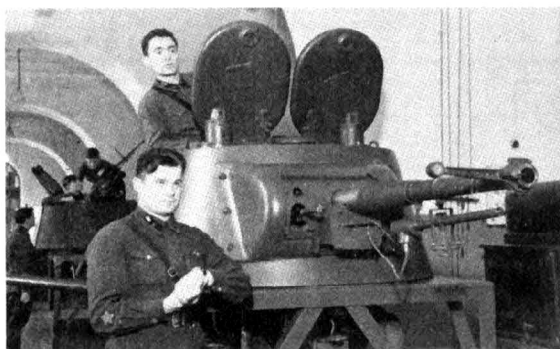
number of forward gears was reduced to three. Also introduced was a stabilising system to ensure equivalent braking torque in both forward and reverse motion. The fuel capacity was increased to provide a greater range of operation and a small-pitch track was fitted. The early production models (designated BT-7-1) had the old cylindrical turret of the BT-5. At the same time commanders' tanks, designated BT-7-1(V), had the turret of the BT-5(V) with frame aerial and radio. Shortly after production was under way, however, a new conical turret with improved immunity (similar to that used on the T-26S) was introduced. The armour on this new turret was increased to 15mm. The hull front armour was also increased, from 13 to 22mm, but the side armour remained unaltered. The armour components of the hull and turret, formerly rivetted, were now electro-welded. The employment of electric arc-welding increased the strength and immunity of the hull. The ammunition stowage for the 45mm gun was increased and a coaxial mounting was installed for the 7.62mm machine-gun. The BT-7-2 (as this was now called) was the first of the

series to have the twin-horn periscopes. Some vehicles were also fitted with an additional machine-gun in the rear of the turret and a machine-gun for defence against low-flying aircraft.

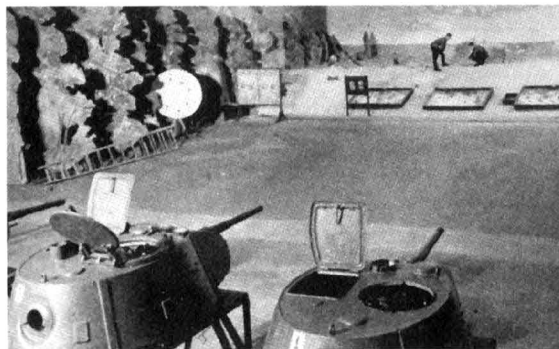
A supporting artillery version of the BT-7 was produced mounting a 76.2mm gun. This vehicle, taken into service as the BT-7A, fired an AP projectile having a muzzle velocity of 1,190 fps. A machine-gun was located in a ball mounting to the right of the gun. The BT-7A moved only on tracks. To provide a more stable firing platform the rear idler was removed and the track taken around the trailing rear road wheel.

Apart from the artillery versions of the BT-5 and BT-7 no other self-propelled mountings were adopted utilising the BT hull and running gear, although numerous experimental models are believed to have been produced.

In December 1934, at the design bureau of the Leningrad Factory, work was begun on a new medium tank, the T-29-5. This was a fast version of the T-28 with the original hull and turrets mounted on Christie (BT-7)



*BT-7-2 Rypa (training turret) at the Stalin Military Academy. (Rypa = Roll, Yaw, Pitch apparatus—a British acronym).*



*Indoor range with BT-7-2 training turrets at the Stalin Military Academy.*

*BT-7-2 crossing heavy ground. Note the prominent twin-horn periscopes on the top of the turret.*



**BT SERIES DATA**

	BT-1/BT-2 early	BT-2 (late)	BT-3	BT-4	BT-5	BT-5A
Crew	3	3	3	3	3	3
Weight, combat (tons)	10.2	11.0	10.2	10.2	11.5	11.7
Length, overall (ft)	18.0	18.1	18.0	18.0	18.1	18.0
Length, including gun (ft)	18.0	18.0	18.0	18.0	18.0	18.0
Width, overall (ft)	7.33	7.33	7.33	7.33	7.33	7.33
over tracks (ft)	7.16	7.18	7.18	7.18	7.18	7.18
Track centres (ft)	6.33	6.33	6.33	6.33	6.33	6.33
Height overall (ft)	7.25	7.25	7.25	7.25	7.25	7.25
Ground Clearance (in)	9/10.5'	9/10.5'	9/10.5'	9/10.5'	9/10.5'	9/10.5'
Ground Contact (ft)	10.66	12.0	12.0	12.0	12.0	12.0
Max speed, road (wheels) (mph)	69	69	69	69	69	69
Max speed cross-country (track) (mph)	39	39	39	39	39	39
Cruising speed (tracks) (mph)	40	40	40	40	40	40
Fuel capacity (galls)	88	88	88	88	88	88
Range, road (wheels) (miles)	187	187	187	187	187	187
Range, cross-country (tracks) (miles)	125	125	125	125	125	125
Turning circle diameter (ft)	40	40	40	40	40	40
Power/wt ratio	34.3	32.6	34.3	34.3	30.4	30.4
Ground pressure (psi)	8.96	8.96	8.96	8.96	9.3	9.3
Trench crossing (ft)	6.85	6.85	6.85	6.85	8.85	8.85
Vertical Step (in)	8/29.4'	8/29.8'	8/29.8'	8/29.8'	8/29.8'	8/29.8'
Grade ability (°)	40	40	40	40	40	40
Fording, unprepared (ft)	3.95	3.98	3.98	3.98	3.98	3.98
Fording, prepared (ft)	—	—	—	—	—	—
Angle of approach (°)	25	25	25	25	25	25
Angle of departure (°)	30	30	30	30	30	30
Steering Ratio	1.7	1.7	1.7	1.7	1.7	1.7
Engine: model	Liberty Aero	Liberty Aero (modified aircraft engine)			M-5 modified Aero engine	
type	12 cyl V petrol	12 cyl V petrol	12 cyl V petrol	12 cyl V petrol	12 cyl V petrol	12 cyl V petrol
output (hp/rpm)	343-400/2000	343-400/2000	343-400/2000	343-400/2000	350/2300	350/2300
cooling	water	water	water	water	water	water
swept volume	NK	NK	NK	NK	NK	NK
bore	NK	NK	NK	NK	NK	NK
stroke	NK	NK	NK	NK	NK	NK
Transmission: (wheels)	chain drive	chain drive	chain drive	chain drive	chain drive	chain drive
(tracks)	sliding gear	sliding gear	sliding gear	sliding gear	sliding gear	sliding gear
gear ratios: 1st	NK	NK	NK	NK	NK	NK
2nd	NK	NK	NK	NK	NK	NK
3rd	NK	NK	NK	NK	NK	NK
4th	NK	NK	NK	NK	NK	NK
reverse	NK	NK	NK	NK	NK	NK
Steering: (wheels)	Steering wheel controlling front pair of bogie wheels					
(tracks)	Clutch and brake					
Tracks: type	drop-forged	drop-forged	drop-forged	drop-forged	drop-forged	drop-forged
width (in)	10.25	10.25	10.25	10.25	10.25	10.25
pitch (in)	10	10	10	10	10	10
shoes/track	73	73	73	73	73	73
Suspension	Christie independent type					
wheels/side	4 large bogie wheels per side					
road wheel diameter (in)	32.5	32.5	32.5	32.5	32.5	32.5
road wheel width (in)	2 x 3.95	2 x 3.95	2 x 3.95	2 x 3.95	2 x 3.95	2 x 3.95
Armament: main	—	37mm M-1930 A/TK gun	45mm L/46 A/TK gun	27mm gun <sup>3</sup>	45mm L/46 A/TK gun	76.2mm L/16.5 gun
auxiliary	2 x 7.62mm air-cooled MGs	7.62mm DTMG	7.62mm DTMG	7.62mm DTMG <sup>4</sup>	7.62mm DTMG	7.62mm DTMG
Traverse (°)	360°	360	360	265	360	360
Elevation (°)	-10 + 10	-4 + 40	-4 + 40	-5 + 25	-4 + 40	-4 + 60
Sighting	Manual sight,	telescope,	vision slits			
Communication	Flag	Flag	Flag	Flag <sup>2</sup>	Flag/radio <sup>5</sup>	radio
Ammunition: main	—	96	96	180	72/115 <sup>3</sup>	72
auxiliary	4000	2709	2709	2709	2394	2394
Armour: type	Designed to withstand small arms fire at all ranges and to be proof against light anti-tank weapons					
turret—front (mm)	13	13	13	13	13	13
sides (mm)	13	13	13	13	13	13
rear (mm)	13	13	13	13	13	13
roof (mm)	10	10	10	10	10	10
hull: side, front	10-13	10-13	10-13	10-13	10-13	10-13
side, rear	10-13	10-13	10-13	10-13	10-13	10-13
front	13	13	13	13	13	13
rear	10	10	10	10	10	10
floor	6-10	6-10	6-10	6-10	6-10	6-10
roof	6-10	6-10	6-10	6-10	6-10	6-10

Notes: <sup>1</sup> wheels/tracks

<sup>2</sup> intended as commander's tank—production models were to have had radio equipment in left-hand turret

<sup>3</sup> right-hand turret

<sup>4</sup> left-hand turret

<sup>5</sup> with/w.o. radio equipment

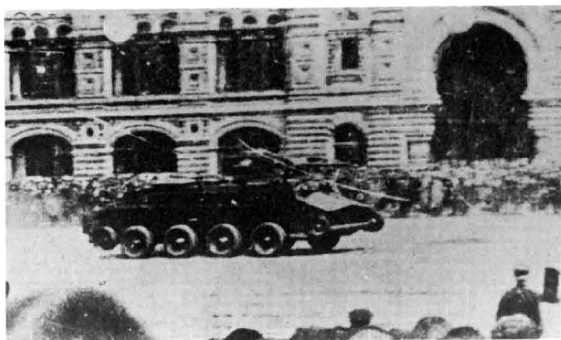
<sup>6</sup> with bridge

<sup>7</sup> tracks only

NK: NOT KNOWN

BT-DT	BT-5PK	BT-IT	BT-5-OT	BT-7-1	BT-7-1V	BT-7-2	BT-7A	BT-7M (BT-8)	BT-1S
3	3	1	2	3	3	3	3	3	3
11.7	11.7	12.7	11.6	13.8	13.6	13.8	13.8	14.65	15.6
18.0	18.0	21.33*	18.0	18.65	18.65	18.65	18.65	18.65	18.98
18.0	18.0	18.0	18.0	18.65	18.65	18.65	18.65	18.65	18.98
7.33	7.33	7.33	7.33	7.98	7.98	7.98	7.98	7.98	7.5
7.18	7.18	7.16	7.16	7.18	7.18	7.18	7.18	7.18	7.18
6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33	6.33
7.25	7.25	7.25	7.25	7.5	7.5	7.5	7.5	7.5	7.5
9/10.5'	9/10.5'	9/10.5'	9/10.5'	10.5/12'	10.5/12'	10.5/12'	12'	10.5/12'	10.5/12'
12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
69	69	69	69	45.6	45.6	45.6	40'	54	70
39	39	5*	39	33	33	33	33	39	40
40	40	40	40	40	40	40	40	40	40
88	88	88	88	174	174	174	174	174	174
187	187	187	187	310	310	310	280'	440	430
125	125	125	125	220	220	220	220	375	370
40	40	40	40	40	40	40	40	40	40.0
30.4	30.4	30	30.4	32.6	32.6	32.6	32.6	35	32
9.3	9.3	10.4	9.3	10.2	10.2	10.2	10.2	10.4	11.0
8.83	8.85	20.0 <sup>†</sup>	6.85	6.0	6.0	6.0	6.0	6.85	6.85
8/29.8'	8/29.8'	8/30'	8/30'	8/30'	8/30'	8/30'	30'	8/30'	8.30'
40	40	40	40	32	32	32	32	32	32
3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.98	3.25	3.25
—	15 (approx)	—	—	—	—	—	—	—	—
25	25	25	25	25	25	25	25	25	25
30	30	30	30	30	30	30	30	30	30
1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7	1.7
				M-17T Liberty modified Aero engine 12 cyl V petrol 450/1750				V-2 12 cyl V diesel 500/2200	V-2 12 cyl diesel 500/2200
NK	NK	water NK	water NK	water 6.6L	water 6.6L	water 6.6L	water 6.6L	water 38.9L	water 38.9L
NK	NK	NK	NK	120mm	120mm	120mm	120mm	150mm	150mm
NK	NK	NK	NK	146mm	146mm	146mm	146mm	186.7mm	186.7mm
chain drive sliding gear NK	chain drive sliding gear NK	chain drive sliding gear NK	chain drive sliding gear NK	chain drive sliding gear 7.7/10.6'	chain drive sliding gear 7.7/10.6'	chain drive sliding gear 7.7/10.6'	chain drive sliding gear 7.7/10.6'	chain drive sliding gear 7.7/10.6'	chain drive sliding gear 7.7/10.6'
NK	NK	NK	NK	16.5/21.6'	16.5/21.6'	16.5/21.6'	16.5/21.6'	16.5/21.6'	16.5/21.6'
NK	NK	NK	NK	34.0/47.0'	34.0/47.0'	34.0/47.0'	34.0/47.0'	34.0/47.0'	34.0/47.0'
NK	NK	NK	NK	Nil	Nil	Nil	Nil	Nil	Nil
NK	NK	NK	NK	NK	NK	NK	NK	NK	NK
drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25	drop-forged 10.25
10	10	10	10	10	10	10	10	10.0	10.0
73	73	73	73	73	73	73	73	73	80
32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5	32.5
2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95	2 × 3.95
45mm L/46	—	OT-130	45mm L/46	45mm L/46	45mm L/46	76.2mm	model L-10	45mm L/46	
	A/TK gun		flame-gun	A/TK gun	A/TK gun	A/TK gun	L/16.5 gun	76.2mm L/26 gun	A/TK gun
7.62mm DTMG 360	7.62mm DTMG 360	7.62mm DTMG —5 +5 —5 +5	7.6mm DTMG 360	2 × 7.62mm DTMGs 360	2 × 7.62mm DTMGs 360	2 × 7.62mm DTMGs 360	1 × 7.62mm DTMG 360	2 × 7.62mm DTMGs 360	7.62mm DTMG 360
—	—4 +60°	—	—10 +40	—4 +40	—4 +40	—4 +40	—4 +60	—10 +40	—10 +40
—	radio	—	radio	flag	radio	flag/radio <sup>‡</sup>	radio	radio	radio
—	72	—	28.6 (galls)	172	188	146/188 <sup>§</sup>	132	40	132
—	2394	2394	2394	2394	2394	2394	2394	2394	2394
and shell splinters									
13	13	—	13	13	13	15	15	15	30
13	13	—	13	13	13	15	15	15	20
13	13	—	13	13	13	15	15	15	15
10	10	—	10	10	10	10	10	10	10
10-13	10-13	10-13	10-13	13	13	13	13	13	15
10-13	10-13	10-13	10-13	13	13	13	13	13	15
13	13	13	13	22	22	22	22	22	30
10	10	10	10	13	13	13	13	13	15
6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10	6-10
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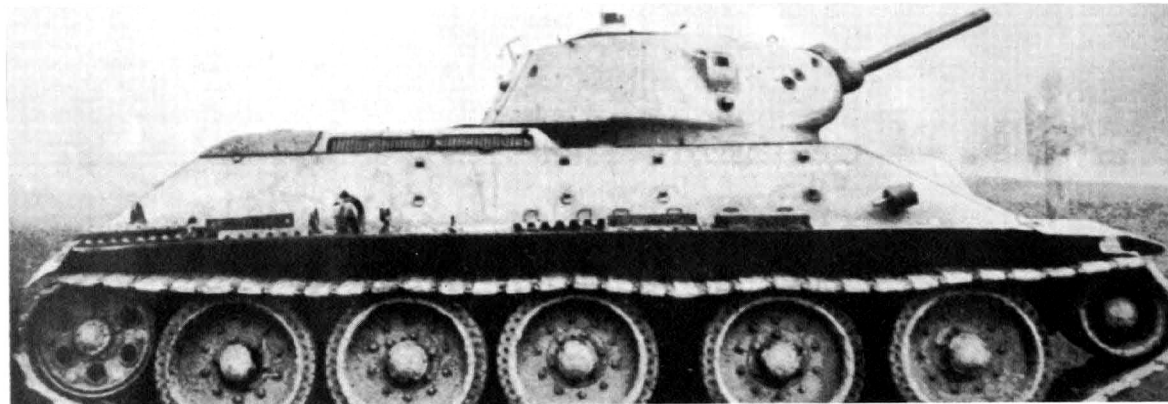




*BT-7M; also known as the BT-8, the last in the series. Among other changes the glacis plate, in the form of an inverted 'V', covered the full width of the tank.*



*The BT-IS experimental tank was a BT-7M with sharply sloped armour on the hull and turret. The resulting configuration foreshadows the shape of the T-34. The BT-IS (Ispitatelnyy = Investigator) was the first Russian tank to have the sloping armour arrangement made familiar by the T-34.*



*T34/76A—the first version of the medium tank that replaced the BT series and which was to be considered by no less an authority than Guderian as "the best tank in any army up to 1943."*

running gear, which incorporated the facility for travelling on wheels or tracks. As opposed to the BT tank when running on wheels the T-29-5 was driven on all four axles which greatly improved its mobility. It could attain a speed of 35 mph on tracks, and 40 mph on wheels. The overall weight of the T-29-5 was about 24 tons. A year later a further variant, the T-29, was built but neither passed the prototype stage.

During 1938 gun-laying in BT tanks was considerably improved with the introduction of a vertically stabilised sight (TOS) designed by engineers V. A. Pavlov and A. Z. Tumanov, as well as the employment of an electric fuze primer.

As well as being used in the Khalkhin-Gol operations in Manchuria during 1938 and in Poland in 1939, the BT-7 was used in Finland in 1940, and finally, against the Germans in 1941. During the Finnish war BTs were shown to have brittle plates which shattered and flaked like the German Krupp plates. Minor turret improvements were made which added to production complexities. Spring-loaded hatches for tank commanders and specially sealed ones for gunners appeared on the later models.

From 1936 onwards M. I. Koshkin became chief designer at the Kharkov factory which was the main producer of BT tanks. He carried out extensive work on modernising this vehicle. Among other new developments the BD-2 experimental diesel engine was tried out in a BT tank. The success of tests with the V-2 tank diesel engine in a BT-5 tank prompted the design and manufacture during 1939 of a number of production

model BT-7M tanks—the first tanks with a powerful diesel engine. These were distributed amongst DD service units. The new V-2 tank diesel was designed by J. Vickman and T. Tshupachin. The BT-7M (also known as the BT-8) weighed 14.6 tons, mounted a 76.2mm gun and had several changes in hull and turret arrangement from the preceding tanks in the BT series: the glacis plate occupied the full width of the tank and was in the form of an inverted 'V'; a hull machine-gun was installed next to the driver, and ball-mounted machine-guns were located in each side of the turret. The turret, which mounted the 76.2mm gun in a new rectangular mantlet, was a departure from the original BT tanks and more closely resembled that fitted to the T-28 medium. Ironically, this last model in the BT series was eventually stripped of its facility for running without tracks. It was first publicly shown during the May Day review of 1938, and employed in operations in the Khalkhin-Gol area and in Finland. Production of BT tanks was terminated during 1939–40 when the BT was replaced by the T-34.

An attempt was made to increase the armour protection on the BT tank by providing it with sharply sloped armour on the hull and turret. One experimental model of a BT-7M, so equipped, was produced for trials during 1936 and designated the BT-IS.

The Finns modified several BT-7 tanks which had been captured in action by providing them with new, high turrets mounting 114mm Spanish howitzers; they designated these BT.42 assault guns.

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# AFV/Weapons Profiles

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## FORTHCOMING TITLES:

### 38 Conqueror Heavy Gun Tank

Changes between conception and production are not infrequent in the development of military equipment, yet the history of Conqueror is probably more bizarre than most. Intended originally for the support of infantry it was then adapted to become the so-called Universal tank—only to be superseded by the design it was meant to replace—and finally emerged into service for a short time as a highly specialized tank killer: BY MAJOR MICHAEL NORMAN, Royal Tank Regiment, author of *AFV/Weapons Profiles 17, 18, 19, 23 and 27*.

### 39 Panhard Armoured Cars

This Profile covers the remarkable eight-wheeled EBR and the compact AML, now used by more than a dozen different countries and both built by Panhards who have a longer connection with armoured car development than any other company in the world still in this field: BY R. M. OGORKIEWICZ, of the Imperial College of Science and Technology, one of the world's leading experts in the design of combat vehicles, author of *AFV/Weapons Profiles 28 and 34*.

### 40 U.S. Armoured Cars

Although armoured cars, a familiar sight in many countries, have never been popular in the United States, more varieties have existed there than is generally realised. This Profile recounts the whole story of U.S. armoured cars from the Davidson car of 1898 to the XM808 on the Lockheed Twister chassis of today: BY COLONEL ROBERT J. ICKS, the famous American armoured expert, author of *AFV/Weapons Profiles 16, 24, 26 and 32*, and *Profile Book AFV/Weapons Series No. 1 Modern U.S. Armored Support Vehicles*.

### 41 M103 Heavy + M41 Light (Walker Bulldog)

The Berlin airlift and the beginning of the so-called Cold War placed new emphasis on the U.S. post-World War II tank programme. The result was the emergence of three basic designs, the T41 Light Tank, the T42 Medium Tank, and the T43 Heavy Tank. This Profile deals with the first and third of these—the T41 which was standardized as the M41 and named the Walker Bulldog, and the T43 which became the M103 Heavy Tank: BY COLONEL ROBERT J. ICKS, author of *AFV/Weapons Profiles 16, 24, 26, 32 and 40*, and *Profile Book AFV/Weapons Series No. 1 Modern U.S. Armored Support Vehicles*.

### 42 Swedish Light Armoured Vehicles

Included in this Profile are the Pbv 302 armoured personnel carrier and its derivatives—the Bgbv 82 recovery vehicle, the ingenious Brobv 941 bridgelayers and the IKV 91 infantry gun intended for operation in the north of Sweden, the Noorland: BY R. M. OGORKIEWICZ, author of *Design and Development of Fighting Vehicles and Armoured Forces*, and of *AFV/Weapons Profiles 28, 34 and 39*.

### 43 PanzerKampfwagen IV

While the Panther and Tiger have tended to capture the limelight, it was in fact the PanzerKampfwagen III and IV which established the reputation of the German armoured forces. The Panzer IV, whose first prototype was built in 1934, eventually became the only German tank which remained in production and troop service throughout World War II, a fact which demonstrates its sound basic design and the brilliant foresight shown in its specification. It was still in service in the Syrian as late as 1967.

### 44 Ferret and Fox Scout and Reconnaissance Cars

Ferrets, developed from the Second World War experience with the Daimler scout cars, have become some of the world's most widely used armoured vehicles. Thus, they are in service not only with the British Army, but also with the armed forces of more than twenty different countries. The successful experience with them has, in turn, led to the even more effective Fox armoured car (or Combat Vehicle, Reconnaissance, Wheeled). This has aluminium armour and much more powerful armament but otherwise retains many of the characteristics of the Ferrets: BY R. M. OGORKIEWICZ.

### 45 Vickers 37-ton Main Battle Tank (Vijayanta)

### 46 Light Tanks M22 (Locust) and M24 (chaffee)

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One of the first series ever to present the reader with accurate colour drawings of locomotives, these are proving very popular with all 'Lovers' of steam—'worthy of framing', to quote one reader.

## Classic Car Profiles

As implied by the name, this 96 part series, at present 'resting', highlights the 'greats'. Heralded at the time of publication as a 'new and unique' series, many of the Profiles are still available. Anthony Harding, as editor, was responsible for this superb series.

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